WHAT IS CLAIMED IS:

1. A high-speed cell search and channel estimation apparatus using a DPSK-based distributed sample acquisition (D^2SA) technique, comprising:

a distributed sample acquisition (DSA) spreading section to pre-sample b state values of sequence generators that generate at least one first main sequence, and spread and scramble user data whose constellation is pre-rotated by scrambling sequences generated using the main sequences; and

a sample spreading section to modulate state samples outputted from the DSA spreading section to differential phase shift keying (DPSK) symbols, and spread the modulated symbols by a first igniter sequence to output spread symbols.

2. The apparatus of claim 1, wherein the DSA spreading section comprises:

at least one first main sequence generator to generate the at least one first main sequence;

a time-advanced parallel sampling section to pre-sample states of the at least one first main sequence generators;

at least one spreader to spread the input user data by quadrature Walsh codes; and

at least one scrambler to scramble the input user data spread by the quadrature Walsh codes by a complex type scrambling code generated from the at least one first main sequence generator.

3. The apparatus of claim 1, wherein the sample spreading section comprises:

a phase shift keying (PSK) symbol mapping section to map the state samples outputted from the DSA spreading section onto a complex symbol and output corresponding PSK symbols $X_{n;}$

a DPSK encoding section to encode the DPSK symbols f_n by adding a phase, integrated until the previous symbol time, to a phase of the PSK symbol X_n outputted from the PSK symbol mapping section;

at least one igniter sequence generator to generate first igniter sequences to spread the generated DPSK symbols f_n; and

a spreader to spread the DPSK symbols f_n by complex igniter sequences generated from a first igniter sequence generator, and output a state signal.

4. A high-speed cell search and channel estimation apparatus using a DPSK-based distributed sample acquisition (D^2SA) technique, comprising:

a sample despreading section to acquire a corresponding igniter sequence from a state signal outputted from a transmitter, despread the state signal using the acquired igniter sequence, and modulate the despread state signal;

a distributed sample acquisition (DSA) despreading section to synchronize transmitter and receiver sequence generators by comparing state sample values of a sequence generator that generates at least one second main sequences with the state sample values demodulated by the sample despreading section, and despread and descramble the spread user data by a descrambling sequence generated using a main sequence corresponding to the synchronization timing; and

a channel estimator to estimate a channel gain and a carrier phase by multiplying a value obtained by DPSK-encoding the state sample values for the sequence generator of the DSA despreading section by the state signal despread by the sample despreading section, and multiplying a spread output value by a filtered value thereof, and output a multiplied value for use in user data despreading and descrambling of the DSA despreading section.

5. The apparatus of claim 4, wherein the sample despreading section comprises:

at least one second igniter sequence generator to generate second igniter sequences;

a despreader to despread the state signal received from the second igniter sequences generated from the at least one second igniter sequence generator;

a symbol correlation section to perform a correlation detection with respect to the state signal despread by the second igniter sequences;

a decoder to DPSK-decode an output value $g_{s,n}$ of the symbol correlation section; and

a PSK symbol demapping section to detect the symbols decoded by the decoder and output state samples.

6. The apparatus of claim 4, wherein the DSA despreading section comprises:

at least one second main sequence generator to generate the at least one second main sequence;

a parallel sampling section configured to sample states of the second main sequence generators in conformity with a sampling timing provided from the second igniter sequence generators of the sample despreading section;

a parallel comparing section configured to compare state samples outputted from the sample despreading section with state samples outputted from the parallel sampling section;

a parallel correction section to repeatedly correct states of the at least one second main sequence generator in accordance with a correction timing provided from

the second igniter sequence generators of the sample despreading section and a comparison result of the parallel comparing section;

a descrambler to descramble the data signal received from the DSA spreading section by complex type descrambling sequences generated from the at least one second main sequence generator;

a despreader to despread the signal descrambled by the scrambling sequences by quadrature Walsh codes;

a data symbol correlation section to correlation-integrate the signal despread by the quadrature Walsh code through the despreader in a unit of a data symbol; and

a multiplier to multiply the estimation value of the channel estimator by the output of the data symbol correlation section and output a synchronized data signal.

7. The apparatus of claim 4, wherein the channel estimator comprises:

a depletion encoding section to depletion-encode the state sample values for the sequence generator of the DSA despreading section;

a first multiplier to multiply an output of the depletion encoding section and the state signal despread by the sample despreading section;

a filter to filter an output value of the multiplier; and

a second multiplier to multiply the value outputted from the filter by the value outputted from the depletion encoding section, and output the channel estimation value to estimate the channel gain and the carrier phase.

8. A high-speed cell search and channel estimation apparatus using a DPSK-based distributed sample acquisition (D^2SA) technique, comprising:

a transmitter configured to sample a plurality of state values by generating at least one first main sequence, modulate the state samples into differential phase shift keying (DPSK) symbols, spread the modulated symbols by a first igniter sequence, and transmit the spread symbols, wherein the transmitter spreads the constellation pre-rotated user data by a scrambling sequence using the main sequence, and transmits the spread user data; and

a receiver configured to acquire the corresponding igniter sequence from the state signal outputted from the transmitter, despread the state signal by the acquired igniter sequence, demodulate the despread state signal, synchronize its respective sequence generators by comparing state sample values of the sequence generators which generate one or more second main sequences with the demodulated state sample values, and despread and descramble the user data from the transmitter using second main sequence corresponding to the synchronization timing and a channel estimator.

9. The apparatus of claim 8, wherein the transmitter comprises:

a distributed sample acquisition (DSA) spreading section to pre-sample b state values of sequence generators that generate at least one first main sequence, and spread and scramble user data whose constellation is pre-rotated by scrambling sequences generated using the at least one main sequence; and

a sample spreading section to modulate the state samples outputted from the DSA spreading section to DPSK symbols, and spread the modulated symbols by the first igniter sequence to output the spread symbols.

10. The apparatus of claim 9, wherein the DSA spreading section comprises:

at least one first main sequence generators to generate the at least one first main sequence;

a time-advanced parallel sampling section to pre-sample states of the at least one first main sequence generator;

at least one spreader to spread the input user data by quadrature Walsh codes; and

at least one scrambler to scramble the input user data spread by the quadrature Walsh codes by a complex type scrambling code generated from the first main sequence generator.

11. The apparatus of claim 9, wherein the sample spreading section comprises:

a phase shift keying (PSK) symbol mapping section to map the state samples outputted from the DSA spreading section onto a complex symbol and output a corresponding PSK symbols $X_{n;}$

a DPSK encoding section to encode the DPSK symbols f_n by adding the phase integrated until the previous symbol time to the phase of the PSK symbol X_n outputted from the PSK symbol mapping section;

at least on igniter sequence generator to generate first igniter sequences to spread the generated DPSK symbols f_n; and

a spreader to spread the DPSK symbols f_n by the complex igniter sequences generated from the at least one first igniter sequence generator, and output the state signal.

12. The apparatus of claim 8, wherein the receiver comprises:

a sample despreading section to acquire a corresponding igniter sequence from the state signal outputted from the transmitter, despread the input state signal by the acquired igniter sequence, and modulate the despread state signal;

a DSA despreading section to synchronize the transmitter and receiver sequence generators by comparing state sample values of its sequence generator that generates at least one second main sequence with the state sample values demodulated by the sample despreading section, and despread and descramble the spread user data by a

descrambling sequence generated using the main sequence corresponding to the synchronization timing; and

a channel estimator to estimate a channel gain and a carrier phase by multiplying a value obtained by DPSK-encoding the state sample values for the sequence generator of the DSA despreading section by the state signal despread by the sample despreading section and multiplying a spread output value by a low-pass-filtered value thereof, and output a multiplied value for use in user data despreading and descrambling of the DSA despreading section.

13. The apparatus of claim 12, wherein the sample despreading section comprises:

at least one second igniter sequence generator to generate second igniter sequences;

a despreader to despread a state signal received from the second igniter sequences generated from the at least one second igniter sequence generator; and

a symbol correlation section to perform a correlation detection with respect to the state signal despread by the second igniter sequences.

14. The apparatus of claim 13, wherein the sample despreading section further comprises:

a decoding section to DPSK-decode the output value $g_{s,n}$ of the symbol correlation section; and

a PSK symbol demapping section to detect the symbols decoded by the decoding section and output the state samples.

15. The apparatus of claim 12, wherein the DSA despreading section comprises:

at least one second main sequence generator to generate the at least one second main sequences;

a parallel sampling section to sample states of the at least one second main sequence generators in conformity with the sampling timing provided from second igniter sequence generators of the sample despreading section;

a parallel comparing section to compare state samples outputted form the sample despreading section with state samples outputted from the parallel sampling section; and

a parallel correction section to repeatedly correct the states of the at least one second main sequence generator in accordance with a correction timing provided from the second igniter sequence generators of the sample despreading section and a comparison result of the parallel comparing section.

16. The apparatus of claim 15, wherein a state of the second sequence generated from the second main sequence generator coincide with a state of the first main sequence of the DSA spreading section.

17. The apparatus of claim 15, wherein the DSA despreading section further comprises:

a descrambler to descramble a data signal received from a DSA spreading section by the complex type descrambling sequences generated by the at least one second main sequence generator;

a despreader to despread a signal descrambled by the scrambling sequences by the quadrature Walsh codes;

a data symbol correlation section to correlation-integrate a signal despread by the quadrature Walsh code through the despreader in the unit of a data symbol; and

a multiplier to multiply an estimation value of the channel estimator by the output of the data symbol correlation section and output a finally synchronized data signal.

18. The apparatus of claim 12, wherein the channel estimator comprises:

a depletion encoding section to depletion-encode the state sample values for the sequence generator of the DSA despreading section;

a first multiplier to multiply an output of the depletion encoding section and the state signal despread by the sample despreading section;

a filter to filter an output value of the multiplier; and

a second multiplier to multiply a value outputted from the filter by a value outputted from the depletion encoding section, and output the channel estimation value to estimate the channel gain and the carrier phase.

19. The apparatus of claim 18, wherein the depletion encoding section comprises:

a PSK symbol mapping section to map the state samples outputted from the DSA despreading section onto the respective complex symbols X_n as PSK symbols; and

an encoding section to produce the DPSK symbol f_n by adding the phase integrated until the previous symbol time to the phase of the PSK symbol X_n.

20. A method of high-speed cell searching using a DPSK-based distributed sample acquisition (D^2SA) technique, comprising:

pre-sampling b state values of a sequence generator that generates at least one main sequence;

differential phase shift keying (DPSK)-modulating the sampled state values;

multiplying respective user data by the DPSK-modulated symbol values;

transmitting a state signal obtained by spreading the DPSK-modulated symbol values by a generated igniter sequence, and transmitting a data signal obtained by modulating the respective user data multiplied by the DPSK-modulated symbol values;

synchronizing states of the respective transmitter and receiver sequence generators after acquiring the igniter sequence from the transmitted state signal; and

tracking and estimating gains of a pilot channel and a traffic channel and a carrier phase after synchronization.

21. A transmitter for a high-speed cell search and channel estimation apparatus using a DPSK-based distributed sample acquisition (D2SA) technique, comprising:

at least one sequence generator to generate at least one main sequence;

a distributed sample acquisition (DSA) spreader, configured to pre-sample a prescribed number of state values of the at least one sequence generator, and spread and scramble user data, the constellation of which is pre-rotated by scrambling sequences generated using the at least one main sequence; and

a sample spreading section, configured to modulate the state samples outputted from the DSA spreader to differential phase shift keying (DPSK) symbols, and spread the modulated symbols by the at least one igniter sequence to output the spread symbols.

22. A receiver for a high-speed cell search and channel estimation apparatus using a DPSK-based distributed sample acquisition (D2SA) technique, comprising:

a sample despreader, configured to acquire a corresponding igniter sequence from a state signal outputted from a transmitter, despread the acquired state signal by the acquired igniter sequence, and modulate the despread state signal;

a DSA despreader, configured to synchronize a transmitter and receiver sequence generator by comparing state sample values of the receiver sequence generator with the state sample values demodulated by the sample despreader, and despread and descramble the spread user data by a descrambling sequence generated using the main sequence corresponding to a synchronization timing; and

a channel estimator, configured to estimate a channel gain and a carrier phase by multiplying a value obtained by DPSK-encoding the state sample values for the sequence generator of the DSA despreading section by the state signal despread by the sample despreading section, and multiplying a spread output value by a filtered value thereof, and output a multiplied value for use in user data despreading and descrambling of the DSA despreading section.